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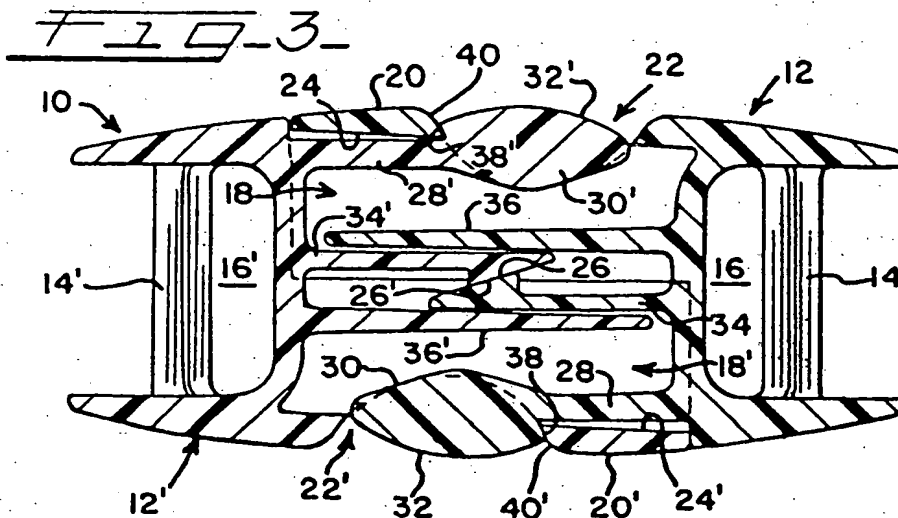
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(54) Buckles.

(57) A buckle (10) has two identical members (12,12') which can be releasably interlocked to each other. Each member has first (28,28') and second (34,34') arms, one of which is resiliently flexible and has a locking tab (30,30') and the other having a ramp (26,26'), the arms being adapted to wedge against an internal wedge formed in the other member so as to cause the members to spring apart when released. The locking tabs (30,30') can be manually pressed by a user to release the members.



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BUCKLES

This invention pertains generally to buckles of a type comprising two releasably interlockable members, for use with a belt of webbing or other material.

As exemplified in US Patent No. 4,171,555 and in US Patent No. 4,150,464, it is known to provide a buckle of the type noted above, in which a pair of locking tabs fit into a pair of locking slots, so as to lock two members releasably to each other, and in which a user is able manually to press on the locking tabs, so as to remove the locking tabs from the locking slots, thereby to release the members from each other.

As exemplified in US Patent No. 4,569,106, it is known in a buckle of the type noted above for two identical, releasably interlockable members to be similarly releasable by a user pressing on a pair of locking tabs, so as to release the locking tabs from a pair of locking slots, which are offset in relation to each other.

Although the buckle disclosed in US Patent No. 4,569,106 offers significant advantages, particularly in terms of manufacturing, the releasable interlockable members of the buckle disclosed therein do not reliably spring apart when the locking tabs are released from the locking slots so as to release such members from each other.

There has been a need, to which this invention is addressed, for an improvement in a buckle of the type noted above.

In accordance with a first aspect of the present invention, a buckle comprises a pair of members which are releasably interlockable to each other and wherein each of said members has a spring finger defining a hook for latching engagement with the other of said members and being operable via manual pressure to release said hook from such engagement, characterised in that each of said members also has a wedging or camming surface which, immediately or shortly after release of said hooks, bears against the other of said members to drive said members apart from each other.

Preferably, the members are identical, and each of the camming surfaces also bears against the other of the members to drive the members from vertically offset positions at presentation into aligned positions at full engagement.

In accordance with a second aspect of the present invention, which is currently the preferred aspect, a buckle comprises first and second members, which are identical to each other, and which are releasably interlockable to each other; each member including a receptacle which has an outer wall, each member having a locking aperture communicating with the receptacle of that member,

and each member including a cantilevered arm, which is adapted to be pressed into the receptacle of the other member when the first and second members are juxtaposed and pressed together; the cantilevered arm of each member being resiliently flexible, the cantilevered arm of each member having an unflexed position and tending to return to that unflexed position when not flexed, and the cantilevered arm of each member being provided with a locking tab, which is adapted to be removably received by the locking aperture of the other member so as to lock the first and second members releasably to each other, when the cantilevered arm of each member is pressed fully into the receptacle of the other member; and the locking apertures being arranged to permit a user to apply manual pressure on the locking tabs so as to remove the locking tabs from the locking apertures; characterised in that each member has a wedging or camming surface, which wedges against the other member so as to draw the members from respective positions wherein the members are not aligned with each other into respective positions wherein the members are aligned with each other as the cantilevered arm of each member is pressed into the receptacle of the other member, and which after application of the manual pressure to remove the locking tabs from the locking apertures helps the first and second members to spring apart.

The locking tab of each member may have a convex wedging surface.

Preferably, the camming surface of each member is a ramp and said ramps are engageable with each other, but it is alternatively possible for the camming surface of each member to be a part of the spring finger or the cantilevered arm such that said parts are not engageable with each other.

It will be appreciated that each of the members may define a slotted portion to which a belt or the like may be adjustably or permanently secured.

Because the first and second members can be identical to each other, significant advantages can be offered, particularly in terms of manufacturing. Thus, the first and second members can be injection moulded by means of a single mould, from a suitable polymer, such as an acetal resin, which is a hard, tough, and resilient engineering resin, and which is preferred.

These and other objects, features, and advantages of this invention will be better understood from the following descriptions of a preferred embodiment of this invention, and an alternative embodiment of this invention, with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of a buckle constituting a preferred embodiment of this invention;

Figure 2 is an exploded perspective view of identical first and second members of the buckle of Figure 1;

Figures 3, 4, and 5 are longitudinal sectional views of the buckle of Figures 1 and 2, the buckle being shown in a fully locked condition in Figure 3, in an intermediate condition in Figure 4, and in a fully unlocked condition in Figure 5;

Figure 6 is an exploded, perspective view of identical first and second members of a buckle constituting an alternative embodiment of this invention; and

Figures 7, 8 and 9 are longitudinal, partially sectional views of the buckle of Figure 6, the buckle being shown in a partially locked condition in Figure 7, in an intermediate locked condition in Figure 8, and in a fully locked condition in Figure 9.

In Figures 1 through 5, a buckle 10, which is designed for use with a belt (not shown) of webbing or other material, comprises a first member 12 and a second member 12', which are identical to each other, and which are inverted in relation to each other when juxtaposed, presented to each other, and pressed together, as described below, so as to interlock the first member 12 and the second member 12' releasably to each other.

The first member 12 and the second member 12' may be injection molded by means of single mold (not shown) from a suitable polymer, such as an acetal resin, which is preferred, as mentioned above.

The first member 12 has a belt-attaching end 14 including a slot 16, through which a first end of the belt may be passed before being riveted or stitched to other portions of the belt so as to form a closed loop in the belt. The second member 12' has a belt-attaching end 14' including a slot 16', through which a second end of the belt may be passed before being riveted or stitched to other portions of the belt so as to form a closed loop in the belt.

The first member 12 includes a receptacle 18, which has an outer wall 20, and a locking aperture 22, which is provided in the outer wall 20, and which communicates with the receptacle 18. The first member 12 has a first ramp 24, which may or may not be included, as shown, in relation to longitudinal axes of the buckle 10, and which is formed on an inner surface of the outer wall 20, and a second ramp 26, which is formed on a shelf portion to be hereinafter described. The first ramp 24 and the second ramp 26 are inclined in relation to each other, as shown, so as to form an internal wedge. The second member 12' includes a receptacle 18', which is identical to the receptacle 18 of

the first member 12 with a locking slot 22' being provided in an outer wall 20' of the receptacle 18' and communicating with the receptacle 18'. The second member 12' has a first ramp 24', which is identical to the first ramp 24 of the first member 12, and a second ramp 26', which is identical to the second ramp 26 of the first member 12. Thus, in the second member 12', the first ramp 24' and the second ramp 26' also form an internal wedge.

The first member 12 includes a cantilevered arm 28, which is provided on its distal end with a locking tab 30 having a convex wedging surface 32, and a shelf portion 34, on which the second ramp 26 is formed. The second member 12' includes a cantilevered arm 28' which is provided on its distal end with a locking tab 30' having a convex wedging surface 32', and a shelf portion 34', on which the second ramp 26' is formed.

The cantilevered arm 28 and the shelf portion 34 are adapted to be pressed into the receptacle 18' of the second member 12' when the first member 12 and the second member 12' are juxtaposed, presented to each other, and pressed together. The cantilevered arm 28, which is resiliently flexible, has an unflexed position (see Figure 3) in relation to the shelf portion 34 and tends to return to the same position when not flexed. The convex wedging surface 32 of the locking tab 30 is structurally and dimensionally adapted to wedge against the first ramp 24' of the second member 12' when the cantilevered arm 28 and the shelf portion 34 are pressed partially into the receptacle 18' of the second member 12' (see Figure 4) and to be removably received by the locking aperture 22' of the second member 12' when the cantilevered arm 28 and the shelf portion 34 are pressed fully into the receptacle 18' of the second member 12' (see Figure 3). The second ramp 26 on the shelf portion 34 of the first member 12 is structurally and dimensionally adapted to wedge against the second ramp 26' on the shelf portion 34' of the second member 12' when the cantilevered arm 28 and the shelf portion 34 are pressed partially or fully into the receptacle 18' of the second member 12' (see Figures 3 and 4).

The cantilevered arm 28' and the shelf portion 34' are adapted to be pressed into the receptacle 18 of the first member 12 when the first member 12 and the second member 12' are juxtaposed, presented to each other, and pressed together. The cantilevered arm 28', which is resiliently flexible, has an unflexed position (see Figure 3) in relation to the shelf portion 34' and tends to return to the same position when not flexed. The convex wedging surface 32' of the locking tab 30' is structurally and dimensionally adapted to wedge against the first ramp 24 of the first member 12 when the cantilevered arm 28' and the shelf portion 34' are

pressed partially into the receptacle 18 of the first member 12 (see Figure 4) and to be removably received by the locking aperture 22 of the first member 12 when the cantilevered arm 28 and the shelf portion 34 are pressed fully into the receptacle 18 of the first member 12 (see Figure 3). The ramp 26 on the shelf portion arm 34 of the second member 12' is structurally and dimensionally adapted to wedge against the second ramp 26 on the shelf portion 34 of the first member 12, when the cantilevered arm 28 and the shelf portion 34 are pressed partially or fully into the receptacle 18 of the first member 12 (see Figures 3 and 4).

As the ramps 26, 26', wedge against each other, the members 12, 12', are drawn from respective positions (see Figure 4) wherein the members 12, 12', are not aligned with each other into respective positions (see Figure 3) wherein the members 12, 12', are aligned with each other.

As presented to each other (see Figures 2 and 5) the members 12 and 12' are vertically offset in relation to each other. When fully engaged (see Figure 3) the members 12 and 12' are in alignment with each other.

The first member 12 has a transverse shelf 36 between the first ramp 24 and the second ramp 26. The transverse shelf 36 forms one wall of the receptacle 18. The second member 12' has a transverse shelf 36' between the first ramp 24' and the second ramp 26'. The transverse shelf 36 forms one wall of the receptacle 18. The transverse shelf 36 of the first member 12 is engaged by the shelf portion 34' of the second member 12' and the transverse shelf 36' of the second member 12' is engaged by the shelf portion 34 of the first member 12 (see Figure 3) with a wedging action, which helps to lock the first member 12 and the second member 12' to each other, when the locking tab 30 is received by the locking aperture 22' and the locking tab 30' is received by the locking aperture 22.

When the locking tab 30 is received by the locking aperture 22', a hooked edge 38 of the locking tab 30 is hooked over a complementarily shaped edge 40' of the locking aperture 22'. When the locking tab 30' is received by the locking aperture 22, a hooked edge 38' of the locking tab 30' is hooked over a complementarily shaped edge 40 of the locking aperture 22.

Each of the locking apertures 22, 22', is dimensionally arranged to permit a user to press on the locking tabs 30, 30', as by means of a thumb and a forefinger of one hand, so as to remove the locking tabs 30, 30', from the locking apertures 22, 22'. The locking apertures 22, 22', are horizontally offset in relation to each other, such that pressure on the similarly offset locking tabs 30, 30', tends also to displace the first member 12 and the second

member 12' in relation to each other from their respective positions in Figure 3 to their respective positions in Figure 5, generally along the ramps 26, 26', such that the first member 12 and the second member 12' tend to spring apart under such pressure.

As shown, the shelf portions 34, 34', tend to be relatively inflexible, as compared to the cantilevered arms 28, 28'. In an alternative embodiment (not shown) the shelf portions may be so shaped and so dimensioned as to be more flexible.

As shown in Figures 6 through 9, a buckle 110, which also is designed for use with a belt (not shown) of webbing or other material, comprises a first member 112 and a second member 112', which are identical to each other, and which are inverted in relation to each other when juxtaposed, presented to each other, and pressed together, as described below, so as to interlock the first member 112 and the second member 112' releasably to each other.

The first member 112 and the second member 112' also may be injection molded by means of a single mold (not shown) from a suitable polymer, such as an acetal resin, which is preferred, as mentioned above.

The first member 112 has a belt-attaching end 114 including a pair of slots 116, through which a first end of the belt may be passed before being riveted or stitched to other portions of the belt so as to form a closed loop in the belt. The second member 112' has a belt-attaching end including a pair of slots 116', through which a second end of the belt may be passed before being riveted or stitched to other portions of the belt so as to form a closed loop in the belt.

The first member 112 includes a cylindrical receptacle 118, which opens at its inner end 120 into a locking aperture 122. The outer end of the receptacle 118 is flared so as to form a camming surface 124 for a purpose to be hereinafter described. The second member 112' includes a cylindrical receptacle 118', which opens at its inner end 120' into a locking aperture 122'. The outer end of the receptacle 118' is flared so as to form a camming surface 124' for a like purpose.

The first member 112 includes a cantilevered arm 128, which is provided on its distal end with a locking tab 130 having a convex wedging surface 132, and which is provided near its other end with a camming surface 134 for a purpose to be hereinafter described. The second member 112' includes a cantilevered arm 128', which is provided on its distal end with a locking tab 130' having a convex wedging surface 132', and which is provided near its other end with a camming surface 134' for a like purpose.

The cantilevered arm 128 is adapted to be

pressed into the receptacle 118' of the second member 112' when the first member 112 and the second member 112' are juxtaposed, presented to each other, and pressed together. The cantilevered arm 128, which is resiliently flexible, has an unflexed position (see Figure 7) in relation to other parts of the first member 112 and tends to return to the same position when not flexed. The convex wedging surface 132 of the locking tab 130 wedges against the camming surface 124, if and as necessary to facilitate pressing of the cantilevered arm 128 into the receptacle 118'. The locking tab 130 is adapted to be removably received by the locking aperture 122' when the cantilevered arm 128 is pressed fully into the receptacle 118'. The camming surface 134 is structurally and dimensionally adapted to wedge against the camming surface 124' when the cantilevered arm 128 is pressed partially into the receptacle 118' of the second member 112' (see Figure 8) and to be received by the receptacle 118' when the cantilevered arm 128 is pressed fully into the receptacle 118' of the second member 112' (see Figure 9).

The cantilevered arm 128' is adapted to be pressed into the receptacle 118 of the first member 112 when the first member 112 and the second member 112' are juxtaposed, presented to each other, and pressed together. The cantilevered arm 128', which is resiliently flexible, has an unflexed position (see Figure 7) in relation to other parts of the second member 112' and tends to return to the unflexed position when not flexed. The convex wedging surface 132' of the locking tab 130' wedges against the camming surface 124, if and as necessary to facilitate pressing of the cantilevered arm 128' into the receptacle 118. The locking tab 130' is adapted to be removably received by the locking aperture 122 when the cantilevered arm 128' is pressed fully into the receptacle 118. The camming surface 134' is structurally and dimensionally adapted to wedge against the camming surface 124 when the cantilevered arm 128' is pressed partially into the receptacle 118 of the first member 112 (see Figure 8) and to be received by the receptacle 118 when the cantilevered arm 128' is pressed fully into the receptacle 118 of the first member 112 (see Figure 9).

As the camming surfaces 124, 124', wedge against the camming surfaces 134', 134, the members 112, 112', are drawn from respective positions (see Figure 7) wherein the members 112, 112', are not aligned with each other into respective positions (see Figure 9) wherein the members 112, 112', are aligned with each other.

As presented to each other (see Figures 6 and 7) the members 112, 112', are vertically offset in relation to each other. When fully engaged (see Figure 9) the members 112, 112', are in alignment

with each other.

When the locking tab 130 is received by the locking aperture 122, a hooked edge 138 of the locking tab 130 is hooked over a complementarily shaped edge 140' of the locking aperture 122'. When the locking tab 130' is received by the locking aperture 122, a hooked edge 138' of the locking tab 130' is hooked over a complementarily shaped edge 140 of the locking aperture 122.

The first member 112 is provided with an actuating member 142, which is cantilevered near the outer end of the receptacle 118 so as to extend back and over the locking aperture 122, as shown, and which is resiliently flexible. The actuating member 142 has a tab-engaging portion 144, which extends into the locking aperture 122, and which is adapted to cam against the convex camming surface 132' of the locking tab 130' (when the first member 112 and the second member 112' are fully engaged) if the actuating member 142 is flexed so as to press the tab-engaging portion 144 against the locking tab 130'. The actuating member 142 is ribbed along its outer surface 146.

The second member 112' is provided with an actuating member 142', which is cantilevered near the outer end of the receptacle 118' so as to extend back and over the locking aperture 122', as shown, and which is resiliently flexible. The actuating member 142' has a tab-engaging portion 144', which extends into the aperture 122', and which is adapted to cam against the convex camming surface 132 of the locking tab 130 (when the first member 112 and the second member 112' are fully engaged) if the actuating member 142' is flexed so as to press the tab-engaging portion 144' against the locking tab 130. The actuating member 142' is ribbed along its outer surface 146'.

If a user presses on the ribbed surfaces 146, 146', of the actuating members 142, 142', as by means of a thumb and a forefinger of one hand, the tab-engaging portions 144, 144', of the actuating members 142, 142' cam against the convex camming surfaces 132, 132', of the locking tabs 130, 130', so as to remove the locking tabs 130, 130', from the locking apertures 122, 122'. The locking apertures are horizontally offset in relation to each other, such that manual pressure imparted via the tab-engaging portions 144, 144', on the locking tabs 130, 130', tends also to displace the first member 112 and the second member 112' in relation to each other from their respective positions in Figure 9 to their respective positions in Figure 8, generally along the camming surfaces 124, 134', and generally along the camming surfaces 124', 134, such that the first member 112 and the second member 112' tend to spring apart under such pressure.

The buckle 10 and the buckle 110 have a

number of common features. Notably, each buckle comprises a pair of members, which are vertically offset when presented to each other, and which when fully engaged are in alignment with each other. Moreover, each member has a wedging or camming surface, which at positions between presentation and full engagement bears against the other member so as to positively drive the members from offset positions into aligned positions. Furthermore, each member has a cantilevered arm or spring finger defining a hook for latching engagement with the other member and being operable via manual pressure to release the hook from such engagement and to cause the wedging surface of such member to bear against the other member so as to drive the members from aligned positions into offset positions.

Herein, directional terms such as "vertically" refer to the buckle 10 and the buckle 110, as shown in the drawings. Such terms are not intended to limit the buckle 10, the buckle 110, or any other buckle embodying this invention to any particular orientation.

Claims

1. A buckle (10;110) comprising a pair of members (12,12';112,112') which are releasably interlockable to each other and wherein each of said members has a spring finger (28,28';128,128') defining a hook (38,38';138,138') for latching engagement with the other of said members and being operable via manual pressure to release said hook from such engagement, characterised in that each of said members also has a wedging or camming surface (24,24';26,26';134,134') which, immediately or shortly after release of said hooks, bears against the other of said members to drive said members apart from each other.

2. A buckle according to claim 1, characterised in that the members are identical, and each of the camming surfaces (26,26';134,134') also bears against the other of the members to drive the members from vertically offset positions at presentation into aligned positions at full engagement.

3. A buckle (10;110) comprising first (12;112) and second (12';112') members, which are identical to each other, and which are releasably interlockable to each other; each member including a receptacle (18,18';118,118') which has an outer wall, each member having a locking aperture (22,22';122,122') communicating with the receptacle of that member, and each member including a cantilevered arm (28,28';128,128') which is adapted to be pressed into the receptacle of the other member when the first and second members are juxtaposed

and pressed together;

the cantilevered arm (28,28';128,128') of each member being resiliently flexible, the cantilevered arm of each member having an unflexed position and tending to return to that unflexed position when not flexed, and the cantilevered arm of each member being provided with a locking tab (30,30';130,130') which is adapted to be removably received by the locking aperture (22,22';122,122') of the other member so as to lock the first and second members releasably to each other, when the cantilevered arm of each member is pressed fully into the receptacle of the other member; and

the locking apertures being arranged to permit a user to apply manual pressure on the locking tabs so as to remove the locking tabs from the locking apertures;

characterised in that each member (12,12';112,112') has a wedging or camming surface (26,26';134,134') which wedges against the other member so as to draw the members from respective positions wherein the members are not aligned with each other into respective positions wherein the members are aligned with each other as the cantilevered arm of each member is pressed into the receptacle of the other member, and which after application of the manual pressure to remove the locking tabs from the locking apertures helps the first and second members to spring apart.

4. A buckle according to claim 3, characterised in that the locking tab of each member has a convex wedging surface (32,32';132,132').

5. A buckle according to any one of claims 1 to 4, characterised in that the camming surface of each member is a ramp (26,26') and said ramps are engageable with each other.

6. A buckle according to any one of claims 1 to 4, characterised in that the camming surface of each member is a part (134,134') of the spring finger or the cantilevered arm (128,128') and said parts are not engageable with each other.

7. A buckle according to any preceding claim, characterised in that each of the members defines a slotted portion (14,14';114,114') to which a belt or the like may be adjustably or permanently secured.

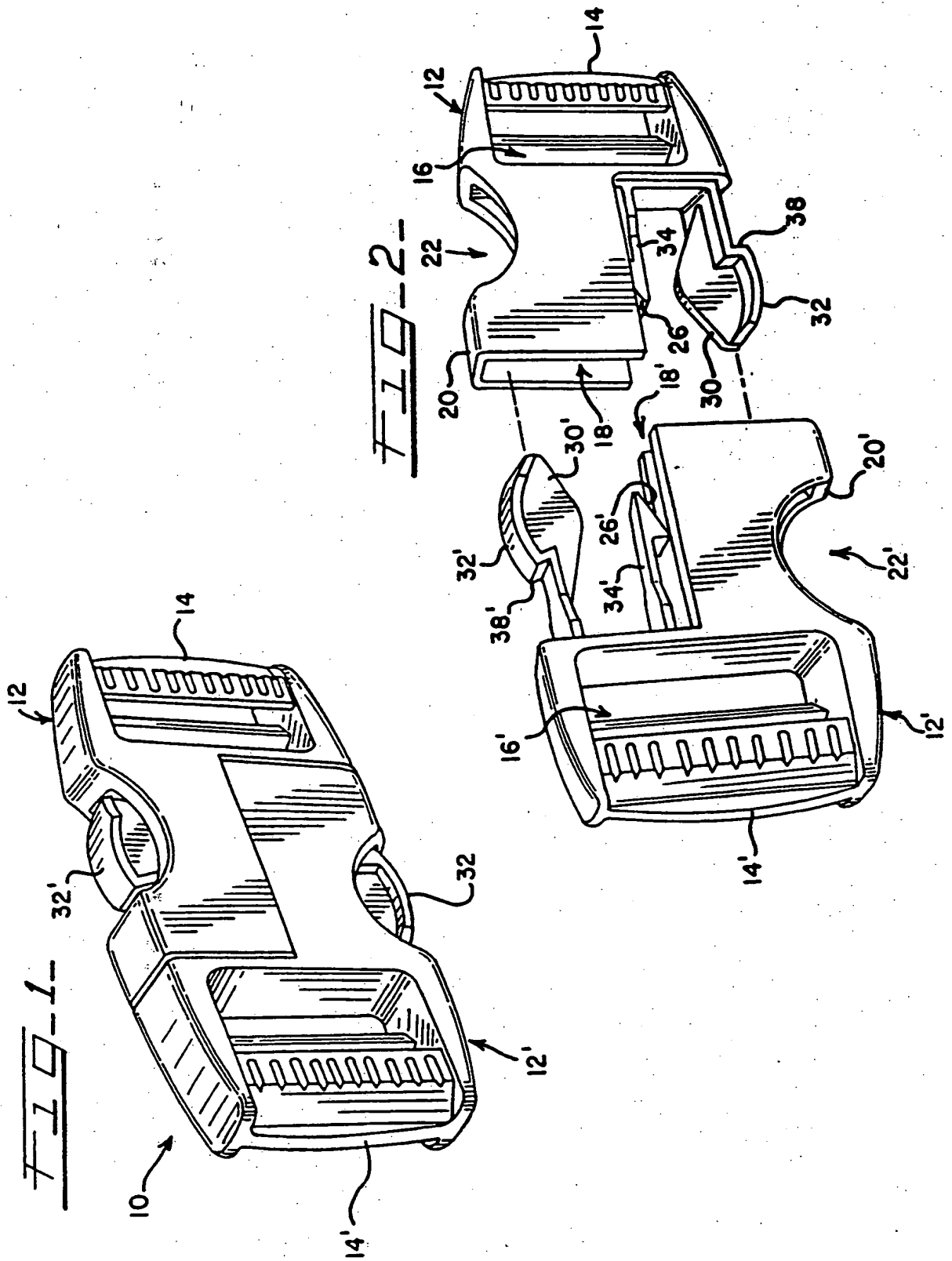


FIG. 3

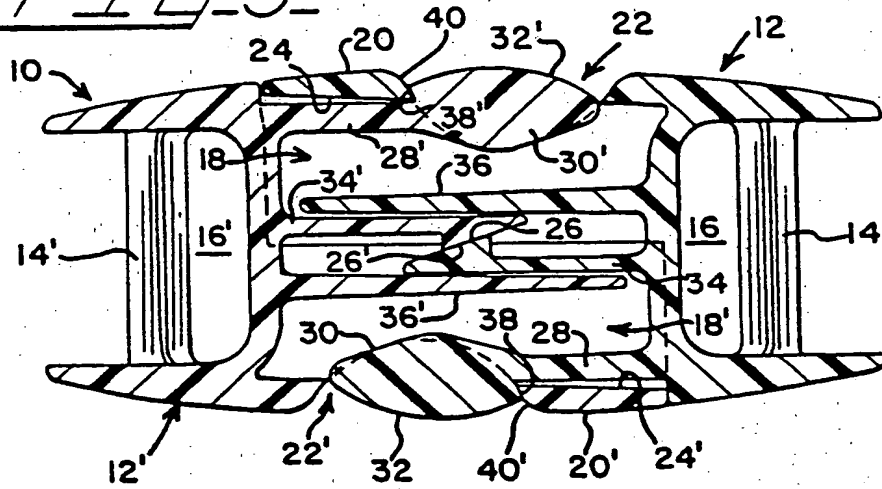


FIG. 4

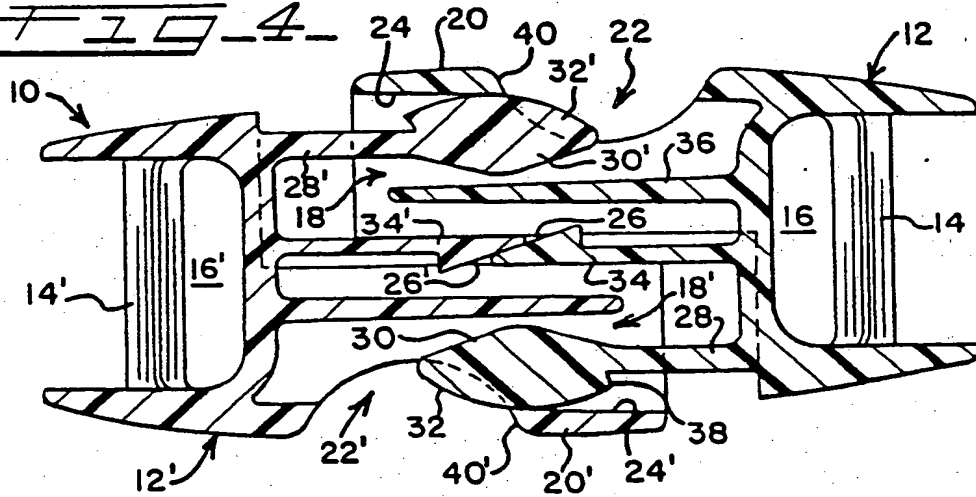
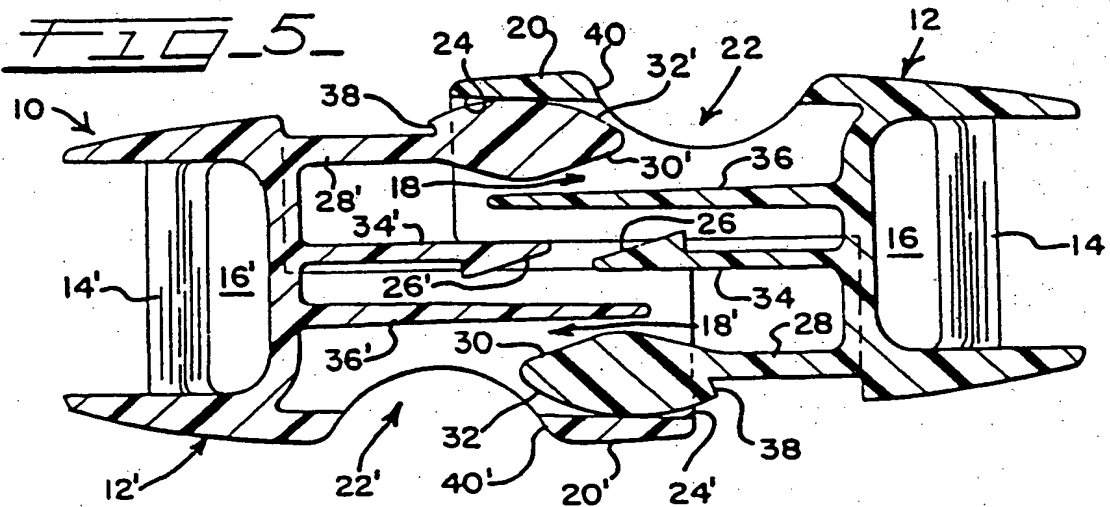
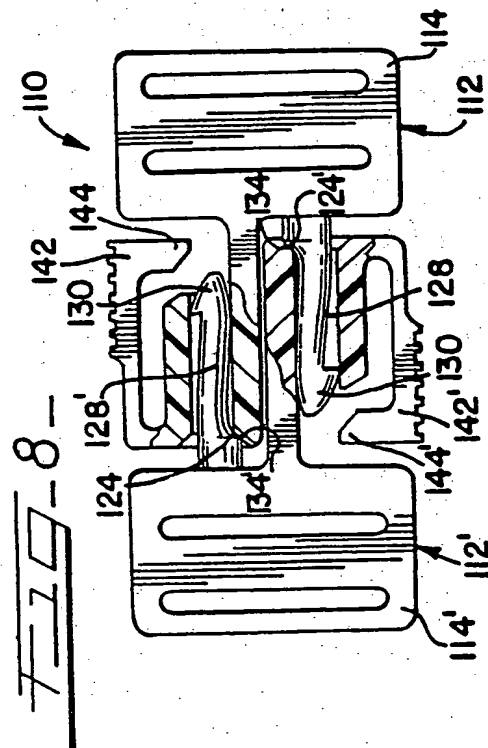
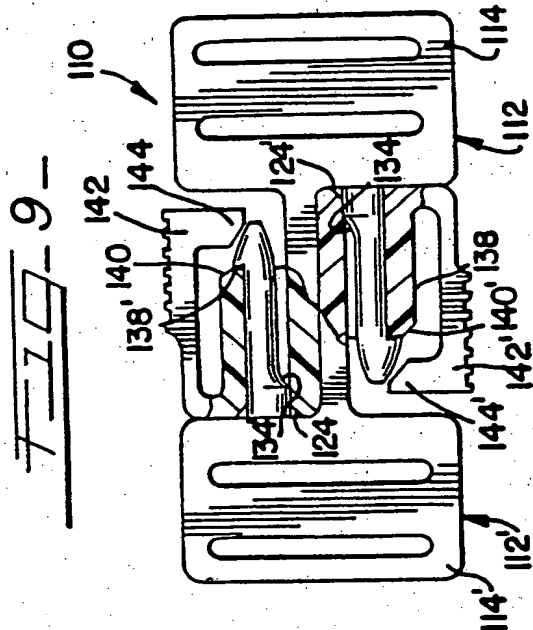
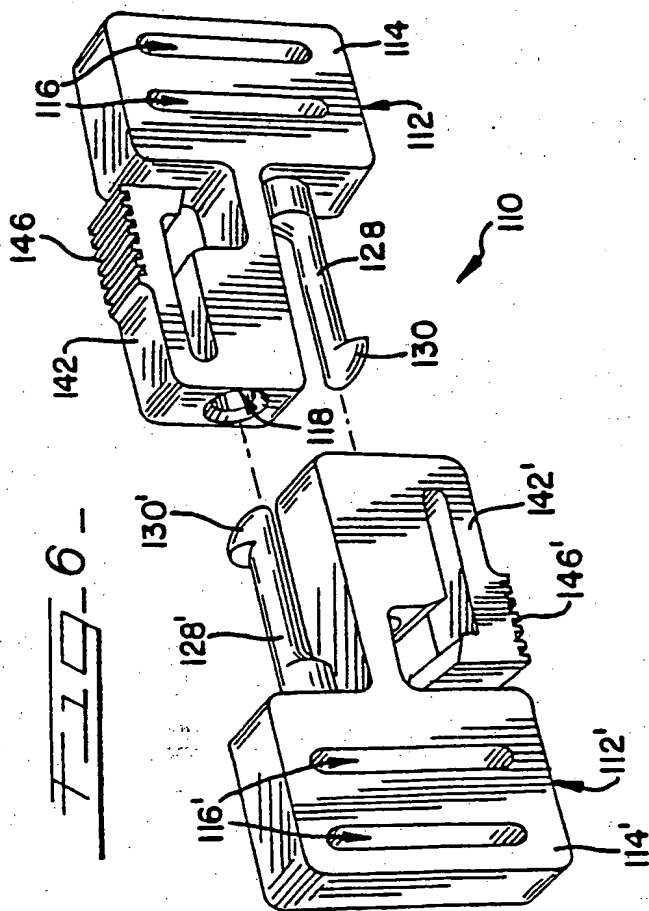
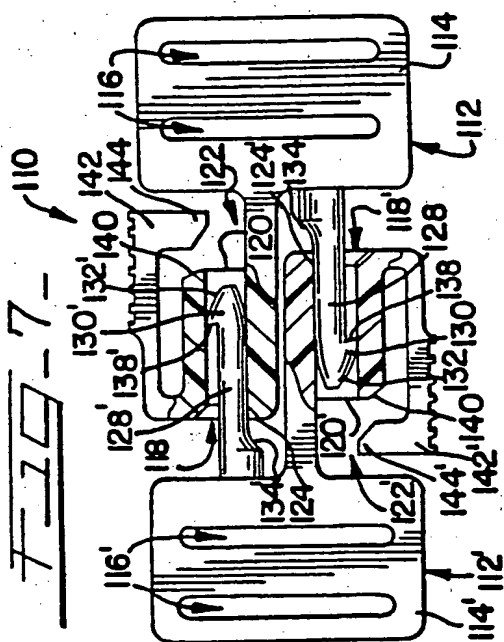


FIG. 5







DOCUMENTS CONSIDERED TO BE RELEVANT															
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)												
A	FR-A-2 501 484 (ILLINOIS TOOL WORKS) * Page 4, line 15 - page 6, line 24; figures 2-5 *	1	A 44 B 11/25												
A	WO-A-8 703 790 (NATIONAL MOLDING CORP.) * Page 6, lines 4-6; page 7, lines 4-7, 26-33; figures 3, 4 *	1													
A	GB-A-2 138 879 (LAW) * Page 2, lines 36-39; figures 1, 3, 6, 7 *	1													
A	GB-A-2 116 626 (ITW FASTEX ITALIA) & US-A-4 569 106 (Cat. D)														
A	EP-A-0 095 656 (AMERICAN CORD & WEBBING)														
A	US-A-1 759 550 (FRIEDLANDER)														
A	GB-A-2 165 299 (ITW DE FRANCE)														
A	EP-A-0 204 250 (YOSHIDA)														
The present search report has been drawn up for all claims															
Place of search THE HAGUE		Date of completion of the search 23-11-1988	Examiner BOURSEAU A.M.												
<table border="0"><tr><td>CATEGORY OF CITED DOCUMENTS</td><td></td></tr><tr><td>X : particularly relevant if taken alone</td><td>T : theory or principle underlying the invention</td></tr><tr><td>Y : particularly relevant if combined with another document of the same category</td><td>E : earlier patent document, but published on, or after the filing date</td></tr><tr><td>A : technological background</td><td>D : document cited in the application</td></tr><tr><td>O : non-written disclosure</td><td>L : document cited for other reasons</td></tr><tr><td>P : intermediate document</td><td>& : member of the same patent family, corresponding document</td></tr></table>				CATEGORY OF CITED DOCUMENTS		X : particularly relevant if taken alone	T : theory or principle underlying the invention	Y : particularly relevant if combined with another document of the same category	E : earlier patent document, but published on, or after the filing date	A : technological background	D : document cited in the application	O : non-written disclosure	L : document cited for other reasons	P : intermediate document	& : member of the same patent family, corresponding document
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